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ABSTRACT

This report documents findings from a qualitative investigation conducted by the Center for Children and Technology (CCT), a multi-year study of the impact of the JASON project on students and teachers. Focus group interviews were used to ascertain how teachers use the JASON curriculum with different groups of students and to explore teachers' use and the impact of the JASON multimedia science curriculum, and the benefits and challenges of being a practitioner in the JASON multimedia environment. CCT researchers examined the ways that participating teachers thought the JASON multimedia science curriculum could be improved to provide greater access to a more diverse population of students. (KHR)

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A QUALITATIVE INVESTIGATION OF TEACHERS AND THE JASON MULTIMEDIA SCIENCE CURRICULUM: REPORTED USE AND IMPACT

YEAR TWO EVALUATION REPORT

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CCT REPORTS

SEPTEMBER 2002

A QUALITATIVE INVESTIGATION OF TEACHERS AND THE JASON MULTIMEDIA SCIENCE CURRICULUM: REPORTED USE AND IMPACT

YEAR TWO EVALUATION REPORT

SPONSORED BY

THE JASON FOUNDATION FOR EDUCATION

AND

U.S. DEPARTMENT OF EDUCATION STAR SCHOOL PROGRAM

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EXECUTIVE SUMMARY

The Center for Children and Technology (CCT) is in the midst of a multi-year study of the impact of the JASON project on students and teachers. In the second year of this evaluation of the JASON Project, CCT researchers utilized a qualitative approach – focus group interviews – to ascertain in more detail how teachers use the JASON curriculum with different groups of students. This report documents findings from the qualitative investigation conducted by CCT as part of Year Two of the study, which is grounded in the results of Year One's study (see Ba et al., 2001; Martin et al., 2001).

The focus group interviews specifically allowed researchers to explore (1) teachers' use and impact of the JASON multimedia science curriculum, and (2) the benefits and challenges of being a practitioner in the JASON multimedia environment. Within these two parameters, CCT researchers examined ways that the participating teachers thought the JASON multimedia science curriculum could be improved to provide greater access to a more diverse population of students (e.g., honor/gifted and talented, general education, at-risk, special education, homeschoolers).

Each group of teachers discussed the ways they use the JASON multimedia science curriculum for their particular student population.

- The teachers of students labeled *gifted or honors* have a lot of flexibility to tinker with the curriculum.
- Teachers of students who perform *at or above average* for their grade levels in regular classrooms adapt the JASON curriculum around their regular curriculum and standards, and they particularly appreciate the multimedia nature of the JASON curriculum.
- The teachers of *at-risk or low-achieving* students have to adapt the curriculum requirements to specific students' reading comprehension and writing abilities.
- The teachers of *special student populations* find the curriculum to be flexible as well as challenging for students with specific learning difficulties or limited English proficiency.
- The *homeschoolers'* use of the print curriculum is supported by their seeking a lot of outside resources for their students, and arranging many field trips with them during the school year.

Despite all the variations in their use of the JASON curriculum and the challenges they faced using it in their respective classrooms, the teachers praised the curriculum as a rich resource for teaching because of its flexible format, interdisciplinary approach, and alignment to national and state standards. They indicated clearly that the JASON project has had a powerful impact on their teaching practices in the following ways. The project (a) introduced them to technology integration; (b) provided the benefits of a well-integrated multimedia curriculum; (c) increased collaboration between teachers and homeschoolers; and (d) made classroom management easier.

They also discussed the various ways their teaching of the JASON curriculum benefited their students. They reported that the JASON project (a) improved their students' learning and performance; (b) excited students, promoted teamwork among them, as well as helped them with reading, writing, and answering questions; (c) reduced their fear of confronting challenges or ambiguity in classroom activities, and helped them focus on their work; (d) provided a vehicle for increased parental participation; and (e) increased students' awareness of the world around them and of everyday science in that world.

Teachers' discussions of the challenges of implementing the JASON Project in their classrooms and schools focused on two main topics: (1) the need to adapt the curriculum, and (2) ongoing training and support. Teachers in each focus group talked about the necessity of adapting the curriculum in order to address the needs of particular students or class configurations. Some teachers hoped the JASON Foundation would make curriculum adaptations easier for them. Others, however, acknowledged that adapting curricular materials was part of their job and that JASON provided the necessary foundation for that. Most, nevertheless, described ways that the JASON curriculum could be improved in terms of ease of use and accessibility for the needs of particular students or class configurations. The adaptation issues discussed included (a) accessibility of the print curriculum; (b) curriculum and academic-level issues; (c) quality of hands-on activities; (d) issues related to standards and testing; and (e) technology access and multimedia issues.

The teachers in these focus groups also discussed issues related to training and support in their specific schools and districts, as well as ways that their local administrations and/or the JASON Foundation for Education could address some of these issues. The teachers described the following obstacles:

- Distant training locations and training time issues
- Technology compatibility and TJO access levels
- Not enough demonstrations of hands on activities
- Cost and marketing issues
- Lack of support in school and the JASON community

The teachers in all focus groups were very enthusiastic when providing recommendations for the JASON Foundation for Education as well as their school and district administrations. Based on participants' reported experiences and their recommendations, the CCT research team has two general recommendations. First, it is important that the JASON Foundation attend to specific curricular materials to make them easier to use in diverse educational settings. Second, the JASON Foundation should work to increase teachers' access to the training for its multimedia science curriculum. Specifically, the JASON Foundation needs to consider the following issues:

- Maintaining a balance between the print curriculum and the various technology components

- Labeling the research materials and technology components by degree of difficulty
- Producing videos demonstrating hands-on activities that are doable within a regular classroom period, and make these videos available on tapes, CD-ROMs, and online
- Expanding the bibliography in the print curriculum and help disseminate information about extra materials available for special populations
- Creating links on the JASON website for sites referenced in the print curriculum
- Translating more JASON curricular materials into Spanish, and increase awareness among teachers of the current availability of materials in Spanish and other languages
- Producing audio versions of the JASON books and other reading materials
- Establishing a scholarship-training program to increase teacher participation in the JASON National Educator Conference
- Encouraging local training to be modeled after the JASON NEC Conference as a realistic and cost effective alternative to present training

Teachers who participated in our study view the JASON Foundation as a strong potential ally in their efforts to successfully implement the JASON Project in their schools and districts. The JASON Foundation can help them by communicating directly with school or district administrations about the importance of:

- Giving students access to JASON chat rooms and the Internet
- Increasing the time for participation at live expedition sites (PIN sites)
- Combining class periods into one long period in a team-teaching situation
- Providing ongoing training and support, especially providing ideas about how to fund-raise
- Marketing to other schools the JASON multimedia science curriculum as a way of building support for funding it
- Networking to share experiences and resources among JASON teachers

INTRODUCTION

The Center for Children and Technology (CCT) is in the midst of a multi-year study of the JASON project's on students and teachers. This report documents findings from the qualitative investigation conducted by CCT as part of Year Two of the study.

Results from Year One showed, among other findings, that teachers use different aspects of the JASON Multimedia Science Curriculum under different school and community circumstances, and that teachers are crucial to the successful and long-term implementation of the JASON Project (see Ba et al., 2001; Martin et al., 2001). In order to better understand teachers' use of the various JASON curriculum components, CCT conducted two large-scale survey studies (see Ba et al., 2002) along with focus group interviews with JASON teachers during the year 2001–02.

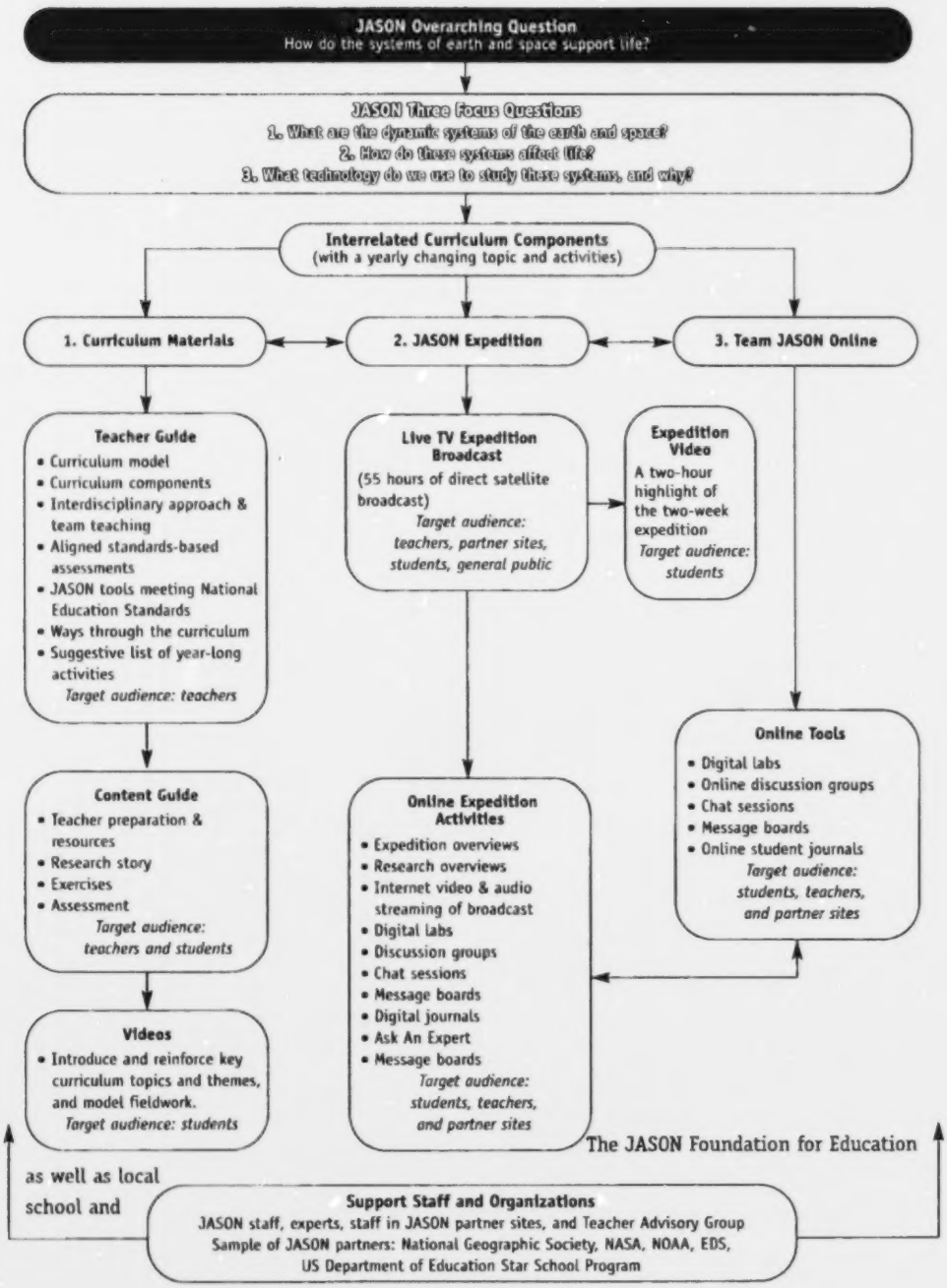
This is a report on the results obtained from the focus group interviews, which specifically allowed researchers to explore: (1) teachers' use and impact of the JASON multimedia science curriculum; and (2) the benefits and challenges of being a practitioner in the JASON multimedia environment. Within these two parameters, CCT researchers examined ways that the participating teachers thought the JASON multimedia science curriculum could be improved to provide greater access to a more diverse population of students (e.g., honor/gifted and talented, general education, at-risk, special education, homeschoolers).

About the JASON Project

JASON's multimedia science curriculum model comprises a holistic collection of resources: a print curriculum and prologue video, live expedition broadcasts and update video, and Team JASON Online (see Figure 1).

- The *print curriculum* mirrors researchers' work in the field or lab and includes a video, which introduces and reinforces key curriculum topics and themes as well as models fieldwork.
- The *live expedition tele-presence*, central to the JASON Multimedia Science Curriculum, allows students to become part of the research team, experience the expedition firsthand, and relate their work to that of the researchers. Held annually at a different location every year for a two-week period, it involves research and Argonaut teams (scientists, teachers, and students), technical and broadcast staffs, JASON partner sites, and the local community.
- *Team JASON Online* (TJO) is a set of integrated online interactions (e.g., teacher-directed exercises, discussion groups, chat sessions, additional curriculum exercises, assessment tools, online journals, etc.) used by teachers, students, and scientists to articulate and share their understanding of science concepts, skills, vocabulary, and projects.

Figure 1: The JASON Multimedia Science Curriculum Components


JASON Overarching Question
How do the systems of earth and space support life?
JASON Three Focus Questions
1. What are the dynamic systems of the earth and space?
2. How do these systems affect life?
3. What technology do we use to study these systems, and why?
Interrelated Curriculum Components
(with a yearly changing topic and activities)
1. Curriculum Materials
2. JASON Expedition
3. Team JASON Online
Teacher Guide
• Curriculum model
• Curriculum components
• Interdisciplinary approach & team teaching
• Aligned standards-based assessments
• JASON tools meeting National Education Standards
• Ways through the curriculum
• Suggestive list of year-long activities
Target audience: teachers
Live TV Expedition Broadcast
(55 hours of direct satellite broadcast)
Target audience: teachers, partner sites, students, general public
Expedition Video
A two-hour highlight of the two-week expedition
Target audience: students
Online Tools
• Digital labs
• Online discussion groups
• Chat sessions
• Message boards
• Online student journals
Target audience: students, teachers, and partner sites
Content Guide
• Teacher preparation & resources
• Research story
• Exercises
• Assessment
Target audience: teachers and students
Online Expedition Activities
• Expedition overviews
• Research overviews
• Internet video & audio streaming of broadcast
• Digital labs
• Discussion groups
• Chat sessions
• Message boards
• Digital journals
• Ask An Expert
• Message boards
Target audience: students, teachers, and partner sites
Videos
• Introduce and reinforce key curriculum topics and themes, and model fieldwork.
Target audience: students
The JASON Foundation for Education
as well as local
school and
Support Staff and Organizations
JASON staff, experts, staff in JASON partner sites, and Teacher Advisory Group
Sample of JASON partners: National Geographic Society, NASA, NOAA, EDS,
US Department of Education Star School Program

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district administrators expect that with this curriculum, students will learn to think critically, explore deep content, use technology to create project work, and will meet local student testing requirements as well as state standards. Teachers are expected to learn along with their students how to manage and guide complex multimedia projects, become familiar with inquiry-based pedagogical methods, and engage intellectually and physically in the scaffolding for new teaching.

About This Evaluation Report

In this second year of evaluating the JASON Project, CCT researchers used a qualitative approach – focus group interviews – to ascertain in greater detail how teachers used the JASON curriculum with different groups of students.

This report is organized into four main sections: (1) research design and methodology; (2) portraits of the different groups of teachers; (3) teachers' use of the curriculum and its impact on their teaching; and (4) issues teachers face in using the curriculum and their training about how to use the JASON materials in their classrooms. Recommendations based on the findings are presented at the end of the report.

RESEARCH DESIGN AND METHODOLOGY

In April 2002, CCT began a qualitative study of teachers' use of the JASON curriculum and its impact on their teaching practices. The study's research method was focus group interviews of teachers using JASON. To understand the use and impact of the JASON curriculum from the perspective of teachers of diverse student populations, we set up five focus groups. Each contained four to five teachers who taught similar types of students, as determined by their responses to the large-scale JASON teachers' surveys. (See section on participant selection below.) A semi-structured focus group interview guide was developed in accord with the goals of the study: to better understand teachers' use of the JASON curriculum and its various components (print curriculum, prologue and update videos, live tele-presence broadcast, and Team JASON Online) to satisfy the different educational levels of the diverse population of students they serve. The data collected from the five focus group interviews were then analyzed for common themes.

Selection of Participants

We used the concept of purposeful sampling in selecting participants (Merriam, 1998), choosing from the pool of teachers who responded to the second teacher survey that was part of the quantitative evaluation component for Year Two (see Ba et al., 2002). Selection was based on five core criteria related to the student populations they serve:

- Teachers of students labeled "gifted" or classes labeled "honors"
- Teachers of students labeled at or above average in mainstream classrooms
- Teachers of students labeled academically "at-risk" or achieving below average
- Teachers of special populations of students, i.e., special education or English-language learners
- Homeschoolers

Teachers were selected with additional criteria in mind, including additional student characteristics (e.g., a diverse range of student race and ethnicity), geographic location, and additional teacher characteristics (e.g., teachers' gender and ethnicity).

It is generally suggested that focus group interviews consist of six to ten participants. However, if participants are known to have much to share or a great deal of experience regarding the topic, smaller groups of four to six are preferable (Kreuger, 1988). Using the above criteria, the initial selection goal was to recruit four to five teachers per focus group from the 1,164 teachers who responded to the second survey sent out by CCT.

When we had determined that the selected sample of teachers was as broad as possible, CCT staff telephoned the teachers. Some had already finished teaching for the year, while others were just completing the school year. In approximately half the calls, the teacher selected could not attend and an alternate had to be contacted. This often meant re-examining the ethnic or community

distribution of the panel and making another selection. The selected teachers had to either check their summer plans or make arrangements for coverage if their school was still in session. In general, at least three phone calls were required per individual teacher and, on average, we spoke to each participant three times. If it was difficult to reach them by phone because they were in class or on vacation, we faxed information to their school or home. Participants in the homeschoolers group were invited to participate in the study by JASON staff.

Once a teacher accepted, CCT staff made travel arrangements for them to attend the focus group sessions held at the JASON National Education Conference (NEC) in Milwaukee, Wisconsin in June 2002. All their expenses (lodging, transportation, meals) were covered by CCT. A total of 23 teachers from different community categories participated in the focus group (see Table 1).

Data Collection

We used focus groups to help us discern patterns of use of the JASON curriculum among teachers serving diverse student populations. Focus groups, also known as focus group interviews, are essentially guided group discussions used in qualitative research to generate an understanding of participants' experiences. In focus groups, participants facilitate each other's understanding of the issues, are less constrained by their role as the interviewee, and are able to elaborate and defend their views in the company of their peers, thus providing rich qualitative data (Stewart & Shamdasani, 1990; Morgan, 1998a).

A professional moderator, working from an interview protocol, conducted all five focus group interviews. The protocol addressed the curriculum, in terms of content and format, and the teachers, in terms of training, experience with the JASON multimedia curriculum, the impact of the curriculum on their students, and suggestions for improving the curriculum (see Appendix). It was developed by CCT researchers based on preliminary survey results. Each focus group lasted approximately 90 minutes and, as noted above, took place during the JASON National Educator Conference in June 2002. An "assistant moderator" took detailed notes during all five of the group interviews, as suggested by Kreuger (1998). These notes served both as an observational record, documenting group participation and nonverbal communication, as well as a back-up to the interview transcripts.

Prior to discussing the above topics, participating teachers were introduced to the evaluation team and each person's role; given an explanation about the purpose of the overall evaluation and the focus group in particular; and told that the focus group interview would be audio-taped, transcribed, and used to write a report in which their names would not be used.

Table 1: Focus Group Composition

FOCUS GROUP	COMPOSITION
1 Teachers of students labeled gifted or in honors classes	**Participant 1:** Midwest, middle school science teacher **Participant 2:** Northeast, middle school science teacher **Participant 3:** Southwest, elementary school teacher **Participant 4:** South, elementary school teacher **Participant 5:** Midwest, elementary school teacher
2 Teachers of students labeled at or above average in mainstream classrooms	**Participant 1:** South, middle school science teacher (military base) **Participant 2:** South/Southwest, middle school science teacher **Participant 3::** Midwest, middle school social studies teacher **Participant 4:** West Coast, elementary school teacher (private school) **Participant 5:** Midwest, middle school science teacher
3 Teachers of students labeled academically "at-risk" or achieving below average	**Participant 1:** Northeast, middle school teacher in urban district **Participant 2:** Southwest, elementary school teacher in urban district **Participant 3:** Northwest, teacher in BIA school on an Indian reservation **Participant 4:** Northeast, middle school teacher in "failing" district **Participant 5:** Midwest, middle school science teacher in suburban district
4 Teachers of special populations	**Participant 1:** Northeast, middle school special education coordinator **Participant 2:** West Coast, middle school teacher (charter school, large population of English-language learners) **Participant 3:** Northeast, elementary school special education teacher **Participant 4:** West Coast, middle school special education teacher
5 Homeschoolers	**Participant 1:** Midwest, children in grades 4 through 12 **Participant 2:** Midwest, children in grades 6 and 7 **Participant 3:** Midwest, children in grades 6 through 9 **Participant 4:** Midwest, children in grades 1, 4, and 5

Data Analysis

CCT researchers analyzed the data for emergent themes to serve as the basis of a detailed report of teachers' experiences, views, feelings, and expectations of the JASON Multimedia Science curriculum, and of its function in their everyday teaching lives. The researchers then refined the findings based on their field notes and the transcripts, as well as their own perspectives about the JASON Project.

Challenges

The focus group interview methodology helped us gain an in-depth understanding of teachers' experiences of and thoughts about the JASON multimedia science curriculum. It also helped us formulate recommendations for improving the curriculum and its support mechanisms. We faced challenges, however, in the recruitment of teachers. First, one major challenge was the time of year of the focus groups. The focus groups were designed to coincide with JASON's National Educator Conference during the third week of June 2002, timing that conflicted with some teachers' school calendars.

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In addition, we must note the limitations of the method we chose. As in any qualitative study, because of the small numbers of involved, participants cannot be expected to be representative of their target population in a statistical sense, and the findings might not be generalizable from one specific focus group (e.g., special education teachers) to the entire special education population of students and their teachers. Nonetheless, we feel the insights that can be derived from this method are sufficiently worthwhile to outweigh its limitations.

PORTRAITS OF THE DIFFERENT TEACHER GROUPS

Overall, the participants in the five focus groups were heterogeneous in terms of their teaching experience, experience with JASON, and teaching context. Their teaching experience ranged from three to over 30 years. Most taught at the middle school level, defined as grades 6 through 8. Their JASON experience ranged from having completed their first year to having completed their twelfth year. The majority taught at public schools in a variety of urban, suburban, and rural settings. Participants also taught in a Bureau of Indian Affairs school, a private school, a school on a military base, and a charter school. Some were homeschoolers.

Participants were assigned to a focus group based on the student population with which they used the JASON curriculum, as indicated on their returned surveys. The groups were as follows:

- Teachers of students labeled "gifted" or classes labeled "honors"
- Teachers of students labeled at or above average in mainstream classrooms
- Teachers of students labeled at-risk or achieving below average
- Teachers of special populations of students, i.e., special education or English-language learners
- Homeschoolers

Teachers of Students Labeled Gifted or Honors

In this group of five participants, three teachers used the JASON curriculum as an enrichment tool for elementary school students in gifted programs, pull-out and push-in, starting in Grade 3; two of these teachers worked in elementary schools with high poverty populations. The other two teachers used the JASON curriculum with "gifted and talented" middle school science classes. One used the Jason curriculum with two sixth grade "gifted and talented" classes at his district's two middle schools. Another used it for "gifted" science classes in grades 6 through 8. (In the report, quotations from this group's participants are labeled "1" in parentheses.)

General Education Teachers

This group included five teachers of students who scored at or above average in mainstream middle school classrooms, with one teacher using it in Grade 5. Schools ranged from a private girls' school in a major metropolitan area to one set on a military base, from a small rural school to an urban Midwestern school whose students are increasingly the children of Mexican immigrants who work in the local meat packing industry. (In the report, quotations from this group's participants are labeled "2" in parentheses.)

Teachers of Students Labeled At-Risk

These group included five teachers. One, at a small school on an Indian reservation, taught seven

students, three of whom were designated as needing special services and had Individualized Educational Plans (IEPs). Two teachers taught in urban districts in the Northeast; one district was described, by the teacher, as having "the lowest scores in the state"; the other is under supervision by its state government. Three of the five teachers used the JASON curriculum with seventh-grade students; one used it with a fifth-grade class and another with a sixth-grade class. (In the report, quotations from this group's participants are labeled "3" in parentheses.)

Teachers of Special Populations

The four teachers in this group taught special education or English-language learners. Three used the JASON curriculum in middle school settings, while one used it with upper elementary students. One of the middle school teachers taught in a charter school with a large number of English-language learners. The rest used the curriculum with students who had a variety of learning disabilities or physical challenges, ranging from use in a self-contained classroom to use in a pull-out resource room. (In the report, quotations from this group's participants are labeled "4" in parentheses.)

Homeschoolers

The four participants in this group were not teachers, but rather, parents of homeschooled children. Most of the parents had more than one child, and their children's grade levels ranged between first and twelfth grades. This unique group, all from the Midwest, provided a window into how homeschooled families use the JASON curriculum. (In the report, quotations from this group's participants are labeled "5" in parentheses.)

USE AND IMPACT OF THE JASON CURRICULUM

The teachers praised the JASON curriculum as a rich resource for teaching because of its flexible format, interdisciplinary approach, and alignment to national and state standards. Further, each group of teachers differs in the ways they use the JASON multimedia science curriculum for their particular student population. The teachers of students labeled *gifted or honors* have a lot of flexibility to tinker with the curriculum. Teachers of students who perform *at or above average* for their grade levels in regular classrooms adapt the JASON curriculum around their regular curriculum and standards, and they particularly appreciate the multimedia nature of the JASON curriculum. The teachers of *at-risk or low-achieving* students have to adapt the curriculum requirements to specific students' reading comprehension and writing abilities. The teachers of *special student populations* found the curriculum to be flexible as well as challenging for students with specific learning difficulties or limited English proficiency. The *homeschoolers'* use of the print curriculum is supported by their seeking a lot of outside resources for their students, and arranging many field trips with them during the school year.

Despite all the variations in their use of the JASON curriculum and the challenges they faced using it in their respective classrooms, the focus group participants indicated clearly that the JASON project has had a powerful impact on their teaching practices in the following ways. The project:

- Introduced them to technology
- Provided the benefits of a well-integrated multimedia curriculum
- Increased collaboration between teachers and homeschoolers
- Made classroom management easier

They also discussed the impact of the JASON curriculum on their students. They mentioned the specific ways their teaching of the JASON curriculum benefited their students. The project:

- Improved their students' learning and performance
- Excited students; the curriculum promoted teamwork among them as well as helped them with reading, writing, and answering questions

- Reduced their fear of confronting challenges or ambiguity in classroom activities, and helped them focus on their work
- Increased parental participation
- Increased students' awareness of the world around them and of everyday science in that world

Teachers' Use of the Curriculum: Overview

The different teachers praised the curriculum as a rich resource for teaching because of its flexible format, interdisciplinary approach, and alignment to national and state standards.

Flexible Format

The flexibility of the JASON curriculum made it easy to adapt to different classroom contexts. According to many teachers, its flexibility was a major strength of the curriculum. It gave them freedom to be creative as teachers, going in their own direction along with their local standards without being controlled by a rigid curriculum.

> *Its flexibility is great. [I used to teach] in a different building every day. Five elementary schools and I taught the fifth and sixth grade.... [JASON] was simple: pick and choose, do what I want, move it around. Two years ago I went to a middle school, so the fifth graders were still in the elementary and the sixth graders were in the middle school and the middle school was departmentalized to their own 43-minute class schedule. So your whole sense of structure changes but the JASON project was manipulatable into that structure. (1)*

The teachers appreciated the format of the print curriculum, which allowed them to seek out and integrate additional resources into their teaching practices. Some teachers reported that JASON's flexible format made it easy to integrate outside resources, such as reading material, films, and television shows into the lessons. Others spoke about how the format promoted the use of local outside resources such as guest speakers and field trips. For example, one teacher invited a high school colleague to speak to his class; the speaker had been involved in a project that sent her to the North and South Poles, which tied in nicely to the 2001-2002 JASON curriculum. Other teachers spoke about the importance of exposing students to local resources, such as visits by local scientists to the classroom, field trips to local science museums, or science exploration trips in the local setting.

The homeschooling group also appreciated the flexibility of the curriculum. They, in particular, employed local resources, including field trips as a regular part of their JASON lessons. One homeschooler described how the flexibility helped her adapt the lessons to her different-age children. Another homeschooler described her use of local resources at some length, how her children (students) gained from and gave back to their community/environment. In her case, she collaborated with a local naturalist who was restoring a prairie through a program called "Species Stewards," where children become junior field biologists and take care of a species throughout a specified

period of time.

> *The nice thing is that this naturalist calls me, and he says, I need a carload of kids to see a small sensitive area. So I was able to bring a carload of 13 year olds to see a savanna which was a real sensitive area. ... If we're talking about exotic species, actually, we just don't talk about JASON things: we talk about the local council, we're talking about historical migrations of people settling in, we talk about the historical migration of our people settling. (5)*

Some of the teachers pointed to the flexibility as a challenge, however, because — particularly for teachers new to the JASON project — it was difficult to know how exactly to use the curriculum. For more on this issue, please see "Training and Support Issues," (p. 29).

Interdisciplinary Approach

Teachers who talked about the interdisciplinary approach of the JASON curriculum were, for the most part, very enthusiastic. One talked about its being more interesting for her to teach. Another talked about the importance of teaching things the way they exist in the real world. "Being a science teacher I always wanted to swap around. I always do science. I love that culture stuff and I love doing the artsy stuff.... I didn't just want to stick to the science this year" (2).

The homeschoolers especially spoke about how JASON's interdisciplinary approach helps them teach all subjects. They talked about the way it opens their children's eyes to the world and events around them. One teacher described how lessons that start out as science lessons lead to social studies lessons and, ultimately, good citizenship. "It really helps me focus on a topic of learning [that] we expand in all areas, not just science. I use a lot of it for language arts as examples in the classroom. We have extra reading and different writings and social studies. I like it because it gives me a platform to spring off from" (5).

National and State Standards

Teachers in all the focus group interviews talked about national and state standards. Several talked about how well JASON aligned with their states' standards, at least for their subjects. "It's not going to meet every standard but in the time I did JASON I can't believe how many different standards I covered compared to when I was teaching whatever my regular units are" (2).

Each Group's Use of the Curriculum: A Detailed View

Each group of teachers discussed the JASON print curriculum in terms of its effectiveness for their particular student population. For example, teachers of gifted classes and homeschoolers used the print curriculum differently from the at-risk and special education teachers. The at-risk and special education teachers were more concerned about issues of adapting the curriculum to their students' academic, physical, and social needs than the other groups. The highlights of discussions in the different groups are:

- The teachers of students labeled *gifted or honors* have considerable flexibility to tinker with the curriculum.
- Teachers of students who perform *at or above average* for their grade levels in regular classrooms adapt the JASON curriculum around their regular curriculum and standards, and they particularly appreciate the multimedia nature of the JASON curriculum.
- The teachers of *at-risk or low achieving* students have to adapt the curriculum requirements to specific students' reading comprehension and writing abilities.
- The teachers of *special student populations* find the curriculum flexible as well as challenging for students with specific learning difficulties or limited English proficiency.
- The *homeschoolers'* use of the print curriculum is supported by their seeking many outside resources for their students, and arranging many field trips with them during the school year.

Teachers of Students Labeled Gifted or Honors: Have considerable flexibility to tinker with the curriculum

According to the teachers of students labeled gifted or placed in "honors" classes, it is easy for them to use the print curriculum because they generally are less restricted in terms of curriculum and standards. They explained that gifted teachers "don't have to follow any rules" and "don't have the same constraints" as regular classroom teachers. Other teachers are "tied to a curriculum. [with goals such as:] 'By fifth grade your students will [will be able to do X]' or "By sixth grade your students will [be able to do Y].' We [teachers of students labeled gifted and talented] don't have that. Our students will [perform above grade level]. You know that because they wouldn't be in the [gifted and talented] program.... So we have a little bit more leeway...and we tend to go off and be adventuresome. We want this exploration" (1).

General Education Teachers: Adapt JASON curriculum around regular curriculum requirements and standards, and find the JASON technology tools useful

The teachers of at or above average students were often faced with the tasks of covering their regular curriculum; teaching their students how to think critically, explore deep content, and create project work; and preparing their students to do well on standardized tests. While some dedicated a lot of time to the JASON Project, others did not have enough time to experiment with integrating the JASON curriculum into their teaching. The teachers able to spend a lot of time on JASON did team-teaching with colleagues in their schools. One teacher explains:

> *A typical day for JASON is I teach in a house system — we're four teachers that work together. ... We mix all our kids into different teams and groups. ... I would just go and spend my whole day teaching that group of kids. I'd have them for three days so I wouldn't have to be interrupted. Then they'll go to the next teacher on the team for three days total immersion*

into whichever story they're on. We've done it that way.... (2)

Those teachers who did not use JASON much in their classroom also attempted to use team-teaching in their school, but were unsuccessful because of they needed to cover their required curriculum and standards before engaging in the JASON curriculum.

Finally, the teachers of at and above average students used the JASON curriculum because of its multimedia tools, which facilitated their use of technology in the classroom. In addition, teachers used the TJO environment to register their students to the JASON Project and visit the JASON websites for research resources. One new teacher to the JASON Project stated, "We're from a small town and technology hasn't really reached us until this year ... [but] I wanted to do things in technology. What we actually did was use [the JASON website] as a research site. This year I really plan to do everything on it."

Teachers of Students Labeled At-Risk: Have to adapt the curriculum to specific students' reading and writing abilities, and face technology access issues

The teachers of at-risk students found the hands-on activities a major strength of the print curriculum. They talked extensively about having to adapt the curriculum to meet the needs of their students. "Sometimes I have to go back and make it a little bit more simplified. I might have to copy it and cut and paste it and add a couple of things. Only because, like I said our fifth graders but they are not working at a fifth-grade level" (3). Further, they were faced with serious technology access difficulties and were not benefiting from the resources provided by Team JASON Online. They noted that this situation limited their teaching of the JASON curriculum. One teacher explained, "My kids...they get frustrated — by technology.... In my case, the service was down because we are out in the middle of nowhere" (3). Another teacher added, "I have one Internet line that my computer is on that I can use. And I have to figure out a way" (3).

Teachers of Special Populations: Find JASON flexible as well as challenging for students with specific learning difficulties or limited English proficiency

The special-needs teachers talked about aspects of JASON that were particularly appropriate for their student population and about aspects that posed challenges for them as teachers of that population.

The strength of JASON for the special-needs students is that it is dynamic and interactive, according to these teachers. "Most of [my students] have specific learning difficulties; most of them have attention problems, which makes learning difficult and that's one reason why JASON is so nice with them because they get to move around a lot and they're not stuck with one task for too long" (4).

Some of these teachers, however, said that the JASON novels and other written materials are difficult for the special-needs students, who have trouble reading at that level either because of learning difficulties or limited English proficiency.

Homeschoolers: Use a lot of outside resources and arrange many field trips, opportunities to tighten family relations, and work with other families

According to one homeschooler, homeschooled students can use a lot of outside resources and take many field trips during the school year. "You have time to do the library videos, the library books, and talk to the naturalists—field trips and go to that site...—we go out with it more than a classroom can" (5). Because many of the homeschoolers teach only their own children, however, they're less likely to do some of the group activities that need a class full of students. "I do have to kind of lead through some of the topics or not use them ..." (5). Some years the homeschoolers conducted some portions of JASON in conjunction with a local support group that brought families together as a group for activities that needed multiple bodies. "Last year, we had a pretty big group. There were 18 kids, and their ages ranged from fifth through ninth grade. And it was wonderful to have that size of a group to really do a lot of activities because you need a group to sometimes make it work" (5). One homeschooler appreciated the opportunity to work in groups through a local homeschool "club" that existed at a local museum, which also serves as the region's JASON PIN site. "But even before that, coming to the training, the correspondence with people online...it was a really positive place where I could reach teachers, and they could respect what I was doing, and I could respect what they were doing—learning each other's presentation methods to improve our own situations" (5). The homeschooling environment allows the JASON curriculum to be used to support social interactions and learning among family members. "There's only five of us, and we try to do [JASON] as a family, only in the evenings, because that's one thing that my husband can participate with. And it's really cool; he came down to the live broadcast ...so JASON has kind of brought him in and makes him feel a part of it" (5). [The above experiences were not all shared by the homeschoolers. One homeschooler, for example, talked about feeling isolated as a homeschooler. "I do sometimes feel like an island out there."]

JASON Project's Impact on Teachers and Students

Despite all the variations in their use of the JASON curriculum and the challenges they faced using it in their respective classrooms, the focus group participants indicated clearly that the JASON project has had a powerful impact on their teaching practices. Their descriptions were moving. One called it "life-changing," while another commented, "A whole world has been opened to me." Teachers were uniformly enthusiastic about the impact of JASON on both themselves and their students. The JASON curriculum helps to structure a culture of learning and provides stimulation for both teachers and students in terms of infusing some variety into the classroom. Although the lesson might sometimes contain material that is "difficult for students to digest," teachers agreed that "JASON plants seeds that might eventually germinate."

I have different kids each year, but I'm learning new areas. I'm growing from the years past. I can relate what I learned last year into this year. ... I feel I can relate with my kids. I can talk about things that are not just textbook topics and I think these kids are much more willing to listen. I have a lot less of a discipline problem. When I'm doing JASON they're more interested, I have much more interest from the children. It makes my life easier and happier. I'm learning, they're learning. (2)

Impact on Teachers

According to the teachers, the JASON Project

- Helped them integrate technology into their teaching
- Introduced them to technology and provided the benefits of a well-integrated multimedia curriculum
- Increased collaboration between teachers and homeschoolers
- Made classroom management easier

The JASON curriculum has motivated teachers to develop new ways of learning about science and other disciplines, change the way they think about learning, and expand their academic and professional interests through up-to-date scientific knowledge and access to a new topic every year.. The teachers talked about how teaching the JASON curriculum has kept them fresh and motivated as teachers. For example, some teachers had had an aversion to science before using JASON and described how it altered their attitude toward learning and teaching science. It introduced an experienced teacher to computers.

It's motivating. Because I'm having just as much fun as they are. Sometimes we do the experiments and sometimes it doesn't work and I have to stand by and laugh. Well, we will just try that again tomorrow and see where we blew it. You know, I just think it's fun and because it does change every year it makes it more exciting for me because I'm learning just as much as they are. (3)

I am a better learner now, after going through this all these years and feel that it's really changed me...[the] way that I look at things. Everything is very multi-dimensional now. And I didn't always do that. (5)

I hated science. The only evidence is my report card. I would fight it all across high school and in college. And as a teacher, I didn't enjoy teaching until JASON. And the reason being that JASON gives it a context. It is a big full picture. It's not isolated. (1)

JASON has helped teachers incorporate computers into their teaching. Those teachers with adequate technology resources found the curriculum easy to integrate into their teaching. One teacher commented, "I'm one of those older teachers, you know; like you, I didn't learn computers in college...JASON got me into computers, got me excited about it" (2). Another remarked, "We

have computer labs and we have desktops for all our eighth graders. So we're very technology oriented. To me it's so much easier to incorporate technology into the [JASON] curriculum... You don't have to fake it; it's there. It's very easy to incorporate that" (2).

Some homeschoolers said their experiences with JASON had given them a new respect for conventional classroom teachers. They were able to share experiences and collaborate with classroom teachers about how best to help their students learn. "I think I also really increased my understanding and appreciation for conventional classroom teachers.... I get to work with really great teachers and appreciate the wonderful things they do for kids that aren't learning. And I think that's been a positive result" (5).

The nature of the curriculum and teachers' enthusiasm for it makes classroom management easier. Teachers reported that their students are more engage, therefore I have fewer discipline problems. According to some teachers in the groups, the JASON multimedia science curriculum is an engaging and interesting set of materials for students. Finally, some teachers talked in glowing terms about how much they liked using JASON and the fact that their enthusiasm rubbed off on their students. "I like it. I'm crazy about it. I feel because I'm very enthusiastic about the program I pass that on to my students. So they're excited about it because I'm excited" (2).

Impact on Students

The teachers discussed the impact of the JASON curriculum on their students by linking their own responses to JASON with those of their students. They specifically mentioned various ways their teaching the JASON curriculum benefited their students:

- Improved students' learning and performance
- Excited students and promoted teamwork among them, as well as helped them with reading, writing, and answering questions
- Reduced students' fears of confronting challenges or ambiguity in classroom activities, and helped them focus on their work
- Increased parental participation
- Increased students' awareness of the world around them and of everyday science in that world

Several teachers talked about the children really understanding and using the material, retaining it. One teacher said they used what they learned for their science fair projects. Another, a teacher of academically underachieving students, said that they continued to use their new vocabulary and even corrected another teacher when she used the terminology incorrectly.

> *They are talking and using vocabulary that they learned. They corrected their social studies teacher. The teacher came to me and said, you know, these kids said to me that there was a difference between climate and weather. She had said climate, weather, same thing. And my students corrected her.... I couldn't believe it. This was months after we talked about it. (3)*

A homeschooler talked about how the impact of the JASON curriculum was demonstrated when her daughter, whom she described as not "a science kind of person," began attending a local high school.

> *She gets a top grade in her biology class, and she's not a science kid. And it was very easy for her...because this class [JASON] was so innovative, she was really just able to do this.... She's extremely science literate.... And I know, no matter where she goes, she will take this with her. (5)*

Some teachers talked about the JASON curriculum making their students more confident when faced with challenging tasks. One teacher said that it had an interesting impact on bright students who were accustomed to figuring out what the teacher wanted—"the right answer"—and were very uncomfortable with the ambiguity in the JASON curriculum. "I do an end-of-the-year assessment and they have to write something that they remember about the school year that they really enjoyed, and the JASON project came up constantly" (3). According to some teachers, when the students became engaged with the material, they were able to focus on it. One teacher attributed this, in part, to the variety of the JASON routine. "There's certain level of focus that they [the students] get just from that experience. I do a little of everything and I think that it lends itself to that" (1). Teachers often perceived this situation as part of the natural process of using the JASON curriculum with a diverse population of students.

According to many of the teachers, the JASON curriculum made students enthusiastic about learning, and specifically, learning science. "They get so excited about it, they always want to know, where's JASON going next? What are we doing next year? .... You know, it's not what book do we get, but where are we going as if we're really, literally transported there which is fabulous" (5). They wanted to show the teachers their work from previous years, or just the previous night. "My students are very enthusiastic, and when they would come in the next day and say what they had put in their journal, and it was like, I couldn't believe it because my students just don't do homework...." (4).

Furthermore, students got their parents involved in the JASON project. Some teachers talked about how parental involvement cannot help but have a positive impact on the students.

> *I tell my parents on the school website how to go to JASON...and the parents are coming back and telling me about the JASON site, so I know the parents are looking at it as well. So you're getting the parental input, which is great because, of course, it helps the child. Now I won't say that happens with all my kids but even a few parents are so much better then none. (2)*

Teachers who have adequate access to computer and Internet technologies were pleased with the JASON multimedia components (e.g., TJO, video, and live expedition broadcast), found that these curricular components excited their students, helped the students with reading, writing, and answering questions. They reported that this increased motivation improved student learning and student behavior, for different groups of students.

There are a lot of kids that have a lot of problems, slower, lower levels of ability but they are much more willing to sit at a computer and work on a digital lab. I would assume that they are learning from that because they're still having to read directions, they're still having to follow directions, still having to write because they are required to write.... There are questions that they are required to answer. (2)

Teachers in the regular and special needs groups had positive responses to the JASON videos. The visuals provided their students with concrete ideas about the topic and places being covered in each year's curriculum. "It [the video] gave good visuals. I think it was the visual...what the area actually looked like that we were talking about, kids were very interested in it" (2). One special needs teacher talked about showing the closed-captioned videos because of a deaf student and how it benefited all of the students.

[This deaf student] has an interpreter with her all the time. She can do the computer things at home. We can have a conversation online about what she was learning, we were on the same level as I was with other children. And then we got closed-captioned videos..., so she can sit in the classroom and have the same experience. There it is, right on the screen. And it's better for the rest of the children because they don't hear— although they don't have a hearing problem— they don't hear in middle school, they miss a lot, but with captions up there for them to read, they can hear the technical terms, they can hear the names, and that's an enhancement to have those captions. It's such a good thing. That was just a very positive thing. (4)

Participants believe that the multimedia components of the curriculum promoted teamwork among the students. They noted that students were more likely to work collaboratively, without being told to, when they used the technological components of JASON.

With the technology I find kids are much more willing to help other children. If a child has a computer, say they're on a digital lab and they don't understand, this child over here is much more ready to say, "Look, let me show you." And sometimes these kids that are showing are not my best and brightest kids who are showing other kids. To me that's certainly a benefit. (2)

Many of the teachers talked about how the JASON curriculum made their students more aware of the world around them. They talked about it showing their students that "learning is happening in the real world, not just under their textbooks." Some teachers talked about the JASON curriculum smashing the stereotype of scientists as old white men in lab jackets and glasses, making science a more appealing career option for their students. Students "can actually see [on the live expedition broadcast, and videos], 'Oh, maybe this is something I'd like to do.' Here's these people in their twenties sloshing around and doing these things. They will role model for these students the careers that are available" (1). One homeschooler talked about her son, who had always wanted to be an engineer, deciding that he wanted to teach as well because of the JASON Project.

> *My son is going to college in June, and he got into JASON because of his interest in engineering, and he still wants to [do that], but now he has an interest in teaching and communicating. He doesn't just want to go and be a designer somewhere. He wants to teach and explain to other people, and that is also in part due to JASON—the whole experience of communicating what you're doing is part of your obligation to learning and sharing your excitement. He's seen all these people share excitement and wants to do that too. It was just being an engineer before. (5)*

The teachers pointed out how the global aspect of JASON topics increased students' awareness and also how interactions with students around the world make them feel more connected. "I think that it makes them more aware of the global aspect, especially if they are participating online because there are schools all over the world who are participating which makes them feel like they are part of a bigger thing" (1).

To these teachers, however, it was important that the JASON Foundation maintain a balance between the print curriculum and the technology. They said it was important to keep the technology for those who could use it, but to also make sure that the curriculum was not dependent on the technology so that teachers with trouble accessing the technological resources could still use the JASON curriculum, "as long as JASON keeps in mind that they need to have a balance of both. The technology component is wonderful. It's great, but not all schools are going to be able to access [it]. So as long as there's that balance, ...you don't feel so left out" (1).

CHALLENGES AND ISSUES FACED BY TEACHERS

This section deals with the challenges and issues the JASON teachers faced when using the JASON curriculum. It is organized around the following topics:

- Improving the JASON curriculum by adapting it to local circumstances
- Hands-on activities
- Standards and testing
- Technology access and multimedia
- The training and support needed to improve the use of the curriculum

Improving the JASON Curriculum by Adapting It

Teachers in all the focus groups talked about needing to adapt the curriculum in order to address the needs of particular students or class configurations. Some teachers hoped the JASON Foundation would make curriculum adaptations easier for them. Others, however, acknowledged that adapting curricular materials was a part of their jobs and that JASON provided the necessary foundation for that. Most, nevertheless, described ways that the JASON curriculum could be improved in terms of ease of use and accessibility for the needs of particular students or class configurations. The issues discussed included:

- Accessibility of the print curriculum
- Curriculum and academic-level issues
- Quality of hands-on activities
- Issues related to standards and testing
- Technology access and multimedia issues

JASON Curriculum and Special Populations

While teachers expressed appreciation for the strengths of the JASON curriculum, namely, its flexibility for use with students of different populations, teachers of special populations wanted additional resources to make the curriculum accessible to a wider range of students, such as younger students, special needs students, English-language learners, and at-risk students. They emphasized the need to adapt the curriculum for their specific student populations.

> *For the special needs children, they have to be able to [participate] like everybody else. The activities need to have that extra component somewhere.... It has to be written into the curriculum or added to the curriculum.... It doesn't have to be the whole plan, it's just the idea. (4)*

The thing that I find most difficult is the vocabulary.... A lot of them are bilingual and they don't have a lot of experience with the English language as it is, and then they get what we would consider easy science language. To them, it's like they have no idea. So I have to backtrack a lot of things and start from the very, very basic and then work our way up to the actual vocabulary in JASON. (3)

The special education and at-risk teachers thought it important for their students to be able to participate in the English-language arts portion of the curriculum. One teacher said, "[The students] want regular books like everybody else. Last year it was more of a picture story." Some teachers wanted the material to challenge their students and were disappointed by curriculum changes that demanded less of the students. "The research article that is now called the JASON story, the last two years, it has been simplified. I thought three years ago it was more difficult.... I was kind of disappointed because I would rather aim for high and adapt how I assess kids that don't have the ability than to have to try to boost stuff for the higher kids that need that challenge" (3).

Teachers of at-risk and special needs students talked about the extra time and work involved in modifying lessons for their students. For example, one said: "I always do that introductory JASON's story before I do the hands-on and I also build a lot of background information into it because there are assumptions made with the background, with the stories, that they all come with the same background, which they don't. So ...at least in my room, there is a lot of preparation and pre-prep work" (3). Another commented. "The vocabulary was something that—not only did I have to make sure they had skills, ...most of them needed a review...especially with ESL kids...—I had to spend quite a bit of time...translating and interpreting and going over the vocabulary" (4).

Teachers in different groups made suggestions about how to make the curriculum more accessible to their student populations. These findings suggest that the JASON Foundation could do more to disseminate information about extra materials already available for special populations. One recommendation was that the research material be labeled by degree of difficulty so that finding lessons appropriate for special needs students would not require the teacher to read through all the materials. For Spanish-speaking students, one teacher recommended Spanish translations of the materials. Other teachers recommended the production of audio versions of the books and other reading materials so that students could read and listen to them at the same time. "It would be nice if they had an audio component, because I have to read [almost] everything to the kids.... You know, if they can hear it and see it, then it's going to sink in a little bit more" (4). When one teacher mentioned closed-captioned videos, the other participants were eager to hear more details. "I agree with the audio thing...it would be nice if it was in several languages.... They'd be a lot more likely to sit and listen to it.... I agree that they'd get a lot more out of it, they'd be a lot more likely to sit and listen to it. They can hear and look at it at the same time" (4).

JASON Curriculum and Academic-Level Issues

The teachers discussed the fact that the curriculum was designed for middle school students and debated whether or not it was appropriate for other grades to use it. One teacher was disappointed with what she viewed as the dilution of JASON to make it usable in upper elementary classrooms, thus making it less challenging for middle school students. Another teacher thought the curriculum would be less attractive to middle-school students if they knew that elementary school students were using it. "When you work with 12 year olds, you got to kind of motivate them with things about 14 year olds. If you motivate them with things about 9 year olds, they're going to go, 'What? What am I doing with a 9 year old?' You got to kind of downplay that the younger kids are involved in this" (1). In contrast, one teacher who had heard similar complaints from middle school teachers explained why she thought it was good for lower grades to use it.

> *There's no reason to [resent lower grades using the curriculum] because each year there is a different model, but the basic core of it, the three basic questions that are behind JASON and the processes that it's trying to teach [are the same]. By the time those teachers in middle school get our kids who've been doing JASON at the elementary [level], they're only going to find their students stronger. They're not going to be bored. They're not going to say I already know all this because each year it's a new topic. (1)*

Other teachers wanted the curriculum to include adaptations for younger students. One thought that such adaptations would attract more teachers to the curriculum because it would be more user-friendly.

> *I would love to sit down and write up a whole bunch of my ideas and say, "Look, you can do all of this," because a lot of teachers feel "Well, I can only do this grade with it...." I want the teachers to see the potential, and...they automatically say, "No way!" Or it looks more higher-level and, unfortunately, if you teach in a lower- income district, teachers automatically think, "Oh, my kids can't do that." So it would be nice if it had some more alternative activities for even special education children.... It would be nice if there was like an elementary manual that would have a couple of: "Here are the topics they're covering," "These are some low-level books you might want to use," 'These are some...websites," "This may be...not as advanced," or something like that. Unfortunately, I know in my district, if it's not written out and [they're not] told how to do it, the majority of the teachers are not going to want to sit there and spend a couple hours thinking about different ideas and how they can use it. (1)*

Teachers, including middle school teachers, talked about some of the material being difficult for their students to understand. Many talked about the vocabulary being too difficult.

> *My kids are a little younger, so I do find that I can't just take all the activities out of the curriculum and just do them. I need to adapt them. I want to include all my kids, so my 5 -year old isn't able to process the activities as well as my others. And even my 9 and 10 year olds are just getting to the point where the activities are age-appropriate for them.... One of*

the challenges of the curriculum for me is that I have to make it doable and of interest level. (5)

Seventh graders, when they're answering the questions in the digital lab, sometimes they don't understand the questions. They'll ask me to come over and explain it. (2)

On the Internet, they have web links...and some of them are just too hard even for seventh graders to read. Maybe my gifted kids could read on that level. But I find it difficult for many of them to read those articles.... I let them read it and then we discuss it, but I'm losing about half of them that can't read the article; it's just too hard for them. (2)

One homeschooler, however, talked about some of the materials being too easy, which affected negatively her children's interest in using the JASON curriculum's technology components. For example, the children found the quality of the chats about JASON-related novels inconsistent. "It's frustrating because I feel that the level of the novel chats is pretty low. There's not a lot of analysis... And that's not what you want as teachers. We want interpretative questions...." (5)

After discussing this issue, some at-risk teachers agreed that the work of adapting the curriculum was part of their job. Since each class is unique, only the teacher knows exactly how to adjust the material. They therefore concluded that the JASON Foundation should not make the adaptations. They nonetheless made useful suggestions about how some curriculum adaptations can be more easily accommodated.

Teachers suggested putting tabs in the print curriculum to help navigate it (e.g., to find the extended enrichment activities for the lessons). One teacher also wanted the bibliography expanded. "The bibliography used to be much more extensive so that you could find something in your library. And now they have narrowed it down, and some of [the listings] are very exotic, and your local library does not have them. I liked having that long list with things at different levels" (5).

The teachers of at-risk students talked at some length about the importance of maintaining a balance between hands-on content and theoretical content.

The hands-on activities reinforce the concepts that are in the story. But to make life all fun and games, the kids can play and play and play and play, but what's the true science concept behind it? I think there gets to be an age in a kid's life they have to understand there is some science for this Cartesian diver working or for...fat and feathers and why organisms have insulation. So what is the science behind it, and where is the documentation, where is the data, where is the information? Yes, hands-on is great, and wowing them and zowing them is great, but they do need content. (3)

The hands-on is what pulls that content together. That is kind of where ... it makes sense for them. My students will definitely, if I could give them something to manipulate or draw or whatever, every day, they would love it, but they need to understand that there is meat behind it and I want them to get to that meat. (3)

See you read this research story, now you do this hands-on experiment. Does your data go along with what the research story said? You know, I would never do JASON without having that story for me. That is very important. (3)

Hands-On Activities

On the whole, teachers viewed the hands-on activities very positively. Nonetheless, they also felt that some activities seemed incomplete or had mistakes, that their training with the activities was insufficient and, in addition, noted that their time to troll the message boards for "fixes" was limited. Thus, one major problem is the quality of the hands-on activities. Other problems raised concerned the amount of time it took to properly conduct the hands-on activities and the amount of preparation activities required.

After acknowledging that the problems encountered when implementing JASON hands-on activities can be part of the learning experience—"Science is trying to do stuff, and you make mistakes.... That's not actually a bad thing for the kids to experience" (1)—one teacher went on to point out that these problems could, nevertheless, be a deterrent to using the activities. Two examples concern activities that seemed incomplete or had mistakes that participants experienced at the JASON National Educators Conference they were attending at the time of the focus group interviews.

There are times where I'm a little frustrated that some of the activities are, in a sense, not [complete]... For example, yesterday there was one having to do with shipwrecks. The kids were supposed to play a game like Battleship and they were supposed to talk in coordinates. Now, there were actually a couple of problems with the coordinate map.... Now, we've got two adults, myself and a partner, who randomly picked out two different ships that had gone down in the exact same spot. We both plotted it differently and that told me right there, uh-uh, this is not going to work with even sixth graders. They're not going to plot it correctly. Now, this is not to say that this is necessarily a bad thing.... It [should] have more grid squares and also when you're talking about latitude [lines] they're going to be like this [curved], not like this [straight]. Because as you get further north, you're a little bit off mathematically. They don't have time to do that but that's the kind of thing that a teacher would have to do [to make this work]. Otherwise, they're going to ditch that lesson. I would probably ditch it and say, well, we're not going to do it that way. We're going to look for something different. (1)

The teachers told us, "Oh, by the way, this paper you're looking at should be reversed. The order should be reversed." Now this is the first time I've heard that.... I'm wondering how many teachers out there [will] be struggling with this activity. (1)

Although teachers appreciated the availability of the material kits through Carolina Biological Supply, and those who had participated in the JASON Project over the past commented that "it's come a long way," they discussed difficulties of supplying the materials needed for the activities to their students.

> *I find that a lot of times the kids they have hands-on. So you tell them ahead of time, "This is what we're going to do, but I need your help. I need you to bring in..." usually cartons or something.... But, if you need 16 containers from cottage cheese that have been emptied, "We can't, we don't eat cottage cheese," they'll say. You have to have some help from the kids to bring these in and...you can only tell them and remind them. If they can't get the containers, we can't do this. (2)*

Further, some teachers noted that certain assumptions were made vis-à-vis classroom conditions. One teacher's limited use of the hands-on activities was due to lack of basic resources in her school: "I don't have a lab, I don't have a sink, I don't have one room" (1). Another teacher talked about the extra-time needed to plan in advance for the hands-on activities, and the heavy photocopying she had to do in preparation for the lessons.

> *It takes a lot of time to Xerox everything. I go through what I need, absolutely have to Xerox, for...whatever they're going to be doing. Whether they're going to do a research part or whether they're going to do an experiment, whatever they need, whatever papers, whatever handouts. I have to plan ahead of time and then make sure I have paper, make sure I have the time... (2)*

Some teachers talked about the difficulty of doing everything they wanted with the JASON curriculum because there wasn't enough time in their class periods. "I am constrained by time.... I only have my kids for 45 minutes at a time" (1). Others concurred, saying, for example: "Because of the short time period [in class] we really haven't used the online...quite frankly I'm not sure how to use the lab...the online digital [lab]" (2). Further, teachers said the time assigned to the activities in the curriculum was not always accurate. "The only thing I do have a problem with, they loved the activity. I had a sheet made out for them to work with and the problem I came up with is the activity said it would take 45 minutes. It took two days" (2).

Finally, teachers offered some suggestions about how they can be helped to improve their use of the hands-on activities in their classrooms. One teacher remarked that being able to participate in the JASON NEC had made a tremendous difference for him in understanding how to use some of the hands-on activities in this year's curriculum. Another teacher described an arrangement she had with other teachers so that each teacher periodically got the students for a full three hours, basically combining the class periods into one long period. "We all got to be an expert in one area and then rotated the kids and kept them that long stretch and we just immersed in it. And that worked well...we were seeing results...." (2)

Standards and Testing

State and local standards and testing are a problem for a nationwide program like the JASON multimedia curriculum. This problem was a major topic in all the groups apart from the homeschoolers, who did not share any concerns on this topic with us. Although a number of teachers found that the JASON materials aligned with their state standards, some said this was not the case for

them, at least not for all subjects. Some specific areas they cited as not covered were history, social studies, and language arts. The specificity of some state tests may have more or less relevance in a JASON classroom from year to year. Further, one teacher discussed the competing requirements of JASON and other curriculums, and the ways that state tests affect their JASON teaching. For example, one teacher explained, "As far as language arts, unfortunately, in our school system they have a certain number of books that have to be covered. Those books may not be on this [JASON] list. Plus, the students still have to read a certain number of books, so they're under a very stringent guideline" (2). Teachers said that they have to stop teaching the JASON curriculum at the peak of the JASON Project, January and February, in order to prepare students for the test. One teacher said, "Our testing is always the end of January and February...all my [JASON] teaching stops so I can teach [for the test]" (1).

Technology Access and Multimedia

There was a wide disparity in access to computers and other technology enjoyed by the different teachers who participated in the focus groups. Those who had extensive technology resources were grateful for the resources provided by Team JASON Online (TJO). Those who did not, however, were often unable to take advantage of the JASON curriculum's technology-based features. In all focus groups, the teachers talked about technology-related difficulties, even those with access to the necessary technologies. Among the difficulties discussed were access to computers and the Internet, videos and live expedition broadcast, and chat sessions. Across groups the most consistently mentioned technology problems related to teachers' access to computers and the Internet, as well as the chat sessions with the JASON scientists and literature moderators.

Access to Computers and the Internet

Many teachers in the groups talked about difficulties using the online components of JASON because of problems with their computer systems at school. Problems ranged from unstable systems and inadequate systems support and a lack of hardware, software, or connectivity. This is especially true for teachers serving academically at-risk students. Another issue regarding technology use was the inability of students to remember and keep track of their user IDs and passwords;, a corollary to this issue was student mobility.

A few of the teachers mentioned difficulties acquiring hardware, and accessing computers. One teacher was concerned that her equipment would soon be out of date. In contrast, one teacher said her school had ample computers, but their availability for JASON teachers' use was limited because they were dedicated to computer classes. Another teacher said, "Computers weren't an issue for me. I had a brand-new Dell computer in my room, but no Internet access for about three-quarters of the way through the year and at that point, most of the JASON is finished. Our computer lab is used as a class as opposed to a lab" (3).

Another issue has to do with students remembering their passwords to access the TJO environment. This was especially daunting for one special education teacher. "That was a problem I had,

that they were having a hard time remembering the passwords.... They would lose them and I was looking the passwords up on a regular basis." She explained that there was a no easy way to give them easy-to-remember passwords.

> *User names, if there is anyone else in the entire system that has that user name, you can't use it because I wanted to start with their names, just for simplicity and so I could get them in the system and get them started straight away, but, I mean there's only 6,000 Martinezes, so forget that. Sanchezes, forget that, so I started getting really creative but that just made it hard for them to memorize. And then the numbers, it's the same thing; only one teacher and one place can use the numbers 1 through 25, or whatever. (4)*

The homeschoolers seemed to face as many if not more obstacles related to technology as the traditional classroom teachers. Their technology resources were limited, as were resources allocated for technical support.

Well, my system is pretty minimal and right at the moment I don't have the finances to go out and get a more powerful system. Some of the graphics and opportunities you have on JASON online are awesome, but I can't do it because I don't have enough RAM, so it locks up my system or I have just, unfortunately, chosen not to do some of those things and that's a limitation. (5)

One suggested that homeschoolers need more guidance on the different technology components and when and how to start using them so that they don't go straight to the most difficult one, but ease themselves into it instead.

> *When we started out with all this computer stuff, they used to say, we'll hold your hand and then push you. Well I think that...remembering that some people are just getting into computers has been forgotten. There are a lot of people who are just beginning and while pushing you to try new things is good..., you don't have to do that. You can just start out with the simplest things. We knew to tell people that, here's the thing you start with and here's the thing you add after that and here's something a little more complicated. (5)*

Videos and Live Expedition Broadcasts

Although the teachers found the videos useful in introducing and learning about each year's curriculum topic, one regular teacher said she does not use the expedition video: "I'm thinking of going down to one video. I used to get so many.... [At] the end of the year when it shows the whole project or whatever..., I never went back to that because they've been there, they've done it. Too much other stuff I needed to fit in" (2). Another teacher never received any videos: "I never got the video. I don't know whose fault that was.... That is a big part of the program and we just didn't do that part" (4).

Teachers also discussed the live broadcast, although not all focus group participants participated in this curricular component. One teacher had trouble accessing the equipment at her school to watch the live broadcast. Her school has only one LCD projector, and there is great demand for it.

Another teacher had problems accessing the live broadcast and was upset that the JASON Foundation for Education's satellite specifications changed after the school had purchased a dish based on the previous given specifications. "Then, the next year they're telling us we're having problems with our satellite dish and we really need to have [a different satellite dish]" (1). Finally, one teacher raised the issue of insufficient time to cover most of the activities at the live broadcast site and wished for more time for the students to participate in the activities there.

> *We went to the live broadcast and they had some activities there but we only had 30 minutes so they had to pick and choose, which was unfortunate.... They had this big freezer, for example, and the kids could walk in the freezer and have a better idea of what cold we're talking about. We're not talking 50 degrees, they need a sweater, we're talking about covering your face, your nose.... When I read in one of the novels one of the men loses his finger because he gets frostbite, they had a hard time imagining that. Some of them had never seen snow or ice and they just had a hard time with it.... Those activities that they have at the live broadcasts—and I'm lucky that I even got to go to one—were excellent, but they had so little time to do them. I thought it was really a shame, really a shame because they had 10 or 12 activities, they could dress up as a penguin and try to have a little race, but by the time the kids got dressed, they had to get back on the bus, and we were in there wheeling them out. (4)*

Chat Sessions

The teachers in all groups spoke of difficulties participating in live chat sessions. The main issues included hardware and software problems, connectivity, time coordination, systems security, and child safety concerns.

Many without technology issues said it was hard to coordinate access to chats because the time or day did not correspond with their class time. One teacher called attention to the fact that it would be even more difficult for teachers in different countries. At the conference, she had met three educators from Sweden who were in a time zone six hours ahead of Eastern Standard Time. One teacher described being doubly frustrated when she couldn't get a response to her requests for assistance. A homeschooler described having similar experiences and was concerned that teachers would simply give up on the technology if they didn't get better support. Another homeschooler was concerned that the problems accessing JASON online would turn teachers off to these valuable resources.

> *We went in and we were trying to get online and I'm really not sure what happened but... every time we clicked on it, it would take us to what looked like the chat room but there was not a chat going on. And we kept doing this for 25 minutes or more. I'm desperate. The kids are all waiting. Who can I email? I'm calling the county. Is it on yet? Is it on? I finally found an email address and said there is no chat going on with Dr. Ballard. She writes back and said, "Oh, yes, we're right in the middle of it." Well, why can't we get in? I even went onto the message board and said we weren't able to get in. No one ever responded to that. We were very let down. (1)*

I have enough confidence in JASON that I stick through it. I just go to the next researcher chat the next day. But homeschoolers who are new to it— they just get fed up and say, forget it.... If you have a hard time getting into it once or twice, you're not going to go back. (5)

Based on her experience encouraging students to look on the Internet for JASON and non-JASON scientists with information about their research questions, one teacher proposed contacting researchers via the Internet without using the chats. "Many of the host researchers belong to organizations or universities. They have websites and ways that you can ask them questions. I haven't ever found a problem with that.... The kids made queries this year for their research" (3)

Teachers also mentioned schools limiting or denying students access to the Internet or to chat rooms because of budget cuts, security policies, and Internet safety concerns. Problems accessing the chat rooms because of system failures or heavy traffic at the sites were also discussed. Besides the difficulties in accessing the chat sessions, they also found the message boards cluttered, and had difficulty sifting through the numerous JASON emails being sent to them from different places.

My kids were very, very excited because we were going to have an opportunity to chat with Dr. Ballard himself.... To them... he's just like this God, this Titan. I had them print off the pages...from the website. It said "Interview with Dr. Ballard" and they had all read them. They had taken them home the night before...to think about some questions that weren't covered in there that they would like to ask him... We had a real good build up to it. When we tried to get online...we had a glitch because our accountant decided to knock off chat groups. I had spent two weeks petitioning the school board and the school system to allow us into this password-protected environment. (1)

[W]e don't do a lot of chat rooms because the problems—I'm on a military post for one and there's a lot of security. They don't let us bring in a lot. We can't [get] a whole lot, we can't send out a whole lot. Everything is very secure...very, very tight about what we can [access] so we don't. (2)

At our school, a private school...complete paranoia [about kids accessing chat rooms], so I tell the children "Here it is, I didn't tell you. You're on your own." I'm not liable. [If] you want to go to the chat room speak with your parents. (2)

It's really hard to know whether you've gotten real JASON mail these days.... I get JASON mail from a variety of sources, and you have to check that to see whether they have JASON there. So you have to [make] all these little keystrokes and it doesn't sound like much, but if you're doing it every day, it gets tedious. Rather than some little flashing sign saying, "You have JASON mail." (5)

Some teachers suggested that the JASON Foundation communicate directly with schools or districts, to advising them of the importance of giving students access to JASON chat rooms and the Internet. They believed this might lessen their schools' tendencies of denying and/or limiting this

access.

One teacher suggested putting links to the websites referenced in the print curriculum on the JASON web page. "They've gotten better at putting the sites in the curriculum where it fits, but if they have those automatically on the website so the student knows O.K., I did Exercise 1.2 today; there's a website that goes with it. And they can go right to that and click on it without typing in an address.... I think that would be really helpful" (2).

Training and Support Issues

Focus groups participants spent time discussing issues related to training and support in their specific schools and districts, as well as ways that their local administrations and/or the JASON Foundation for Education could address some of these issues. The teachers were faced with obstacles concerning:

- Distant training locations and training time.
- Technology compatibility and TJO access levels.
- Not enough demonstrations of hands-on activities.
- Cost and marketing.
- Development of support in school and the JASON community.

Training Locations and Times

Some teachers talked difficulties with access, given that the training was held at distant locations and scheduled during the school year. "It's kind of difficult...when it's three hours away.... Teachers...most likely don't want to [travel so far] and they had to take time off from school" (1). One teacher used the online training as an alternative to traveling that distance, but still faced training being scheduled during the busy school year. "[The online training] was $50. It kind of introduced you to the whole curriculum. The drawback was, when I took it the first year, it wasn't offered until...school got started.... I had already wanted to get started on JASON by then, and also I was so busy that I didn't have time to do all the activities for the class" (1).

Most of those concerned with the scheduling of the training preferred that it take place before the school year starts so that they could use the curriculum to prepare and not interrupt school time to be trained. One teacher said she didn't mind if the training was during the school year as long as she had the print curriculum before starting school so she would know what materials to buy or collect. Other teachers in her group thought having the print curriculum before school year started would help with planning as well. "I feel like I have something to work with. I can show them—I have all summer to think it through, how we can make it a thematic unit" (3). One teacher, however, had a complaint about receiving the curriculum at the NEC training, but having to go to another training in order to get the affiliation codes and videos. "We received the cur-

riculum at NEC, but in order to get the affiliation codes that you need to get online and get the videos, you have to go back to another training in the fall and I don't think that's right" (3). In each groups teachers talked about the optimal amount of time to spend on training and when in the year it should take place. "The training...it's just an overview. You have to do so much on your own, it would have been nice if we'd had a longer time to explore the sites and sit and look at them" (4). One teacher, however, didn't think the answer was a longer training: "But I'm not saying to do more training, because if you lengthen the training, you're not going to get people to do that. So I think it has to be just a one-day" (5).

While many teachers felt that the one-day training was not enough time to cover the material, those who had two-day trainings tended to think two days provided enough time. Some homeschoolers, however, thought that homeschoolers would be reluctant to devote two days to JASON trainings. When they heard about the two-day option, they were divided about whether or not teachers would show up for additional training. One said, "It would be a lot of work, and nobody's going to show up" (5). But other homeschoolers said they would, especially when reminded of the opportunity it would provide them to compare notes with other JASON teachers.

Some teachers suggested follow-up trainings after several months and other suggested meeting several times for shorter periods of time. "I think that [follow-up] is a really good idea, maybe a mid-year thing.... It would be a nice time not only [for] reviewing what you've done to see where you're at, but [also] to share ideas" (4). A teacher in the at-risk group said she had received training every other Monday from four to six o'clock after school, and liked it. This ongoing approach to training appealed to other teachers in the group. One teacher, however, who had been trained in two after-school sessions, reported that it was difficult doing JASON training from 4:00 to 8:00 p.m. after putting in a full day at school.

Teachers need more time to learn how to use the TJO components. Some teachers in the different groups found the time dedicated to training for the online JASON components to be inadequate. "And I would like to see more on ... the digital labs and the technology part, there's not a lot of training. I mean they go through this huge book that they give you. Well, it's what we got here and I just don't think they give the technology part justice. They barely touch on it" (2).

In the course of discussing the challenges faced by first-time JASON teachers, the groups also talked about how JASON training could be improved. They thought that some challenges are unavoidable and that teachers learn from experience how to negotiate them. Teachers spoke about their initial confusion trying to understand the structure of the curriculum, which in some ways dictates that the choice of topics to be covered in the classroom is made in a nonlinear fashion. The teachers thought this challenge seemed inherent to the process of learning to use the JASON curriculum. "I guess it's what the teacher makes it – like it's all there and you pick and choose" (1). Furthermore, teachers talked about how much they needed to learn beyond the content of the curriculum. "It's more than just looking at the curriculum and knowing what its components are... It's having to understand that you don't have to do it all. It's understanding where

to go for help. It's understanding that, yeah, there are a bunch of teachers that go off in all these other branches" (1).

Although teachers talked about how they adjusted over time as they got used to the curriculum and the annual trainings, the more experienced teachers wondered about the need for teaching new teachers everything about JASON at the outset, such as the origins of the JASON Foundation and the project's history. Another experienced JASON teacher agreed that learning about the JASON project is the sort of thing that has to be absorbed, and certain teachers may have more tolerance for ambiguity than others.

Teachers in the general education group also talked about the staff development units (SDUs) they earn for training activities. Two teachers were concerned that the seven hours of JASON training did not meet the requirement of ten hours of training to earn one SDU.

> *JASON doesn't give us any SDUs, so if you want teachers to participate and to spend that time and that effort, then [award] staff development units. That would be at least something that would initiate them into I need to do this, I need to get these credits. But when we're asking teachers to spend their time and then they're not getting any kind of staff development units for it, it's harder to get teachers that want to do that. They need their SDUs. (2)*

Technology Compatibility and TJO Access Levels

Teachers were concerned about the compatibility between the technologies used during the JASON training sessions and those they use in their classrooms; in addition, they want the TJO environment to be rated in terms of different levels of access for teachers with different levels of technology experience. Teachers need to be shown how to use the technology tools available in the TJO environment. "[If you see it in training] you're much more likely to use that. And that's the same with the technology part. If they don't go over it with you and go through it, there are teachers who don't want to go through the learning of it. They just want to be shown how" (2). One teacher was not comfortable using the message boards to ask for help. "On the notice board they say you can ask for help, but that's kind of overwhelming because you don't know who to ask" (4). Another teacher, who also provides JASON training, thought that the online mentor program should be expanded. A homeschooler talked about problems related to being trained in the TJO components on technology that is different from the technology she would be using at home.

> *In the training session, you're someplace where they have a computer set up to do the training. So there's that system. Now you go home and you try to run the same stuff no matter who you are. You don't have that person there to ask the question and there are all these empty bells and whistles, and you can't even remember how to get there, and you're just blown away by so much stuff and having key things [explained]—"This is where you start to really expand. And this is the most technologically sophisticated thing to do. And this is the easiest"—would really help. (5)*

Another homeschooler agreed. She said that just knowing which technology pieces are easiest to

use and which she should work her way up to would make JASON easier. "Just identify that the message boards are the easiest things to do and the chats are about the hardest thing to do, so start off just doing message boards. When you open up that curriculum...it is overwhelming" (5).

Not Enough Demonstrations of Hands-On Activities

Teachers in all of the groups talked about the need for more demonstrations of lessons, particularly of the hands-on activities. "If they could actually model a lesson instead of just saying, 'Okay, turn to this page, we're going to do this, and this page you're going to do this.' If you could do one whole lesson, I think that would be great" (4). Some noted that the activities they see demonstrated are the ones they bring back to their classrooms. "[The training] was great. It was hands-on and...everything we did over there, I took back to my classroom. I took notes on a lot of it. I brought a bunch of things home that I made. Then I went back to my classroom and I repeated a lot of those things there with the kids, to see if they got the same results that we did" (3).

The idea of video demonstrations was popular among participants. Teachers talked about being visual and needing to see the demonstration. One teacher recommended that the JASON Foundation develop a series of videos demonstrating the hands-on activities, to give them a sense of how to implement them in their specific classroom settings: "'Oh, that's the way it's supposed to look. Okay, I can do that. Or that's going to be impossible with this group of kids I have this year'"(1). One suggested recruiting teachers to do the demonstrations. "You could go in there and teach the video. It wouldn't have to be someone from the national office or JASON" (1). Another suggested putting the video(s) on JASON's website. One teacher suggested limiting the scope of the demonstrations as a way to make them doable in the limited time available.

> *I can see having a place where you could see the set-ups of everything even if you don't go to the activities because doing things in short amounts of time won't do justice to the activity.... The 50-minute times are already too crammed full. What we need to do is see how it's set up. What are the tricky points? And the certified trainers [can explain] that at the end of the session. And that's the most valuable thing. (5)*

However, one teacher was disappointed that the emphasis on hands-on training was detracting from the basic science training. "Sometimes in a conference like this and in the training, there is no time really to set down the science behind all this" (3).

Cost and Marketing

Concern about costs surfaced in all focus groups. According to participants, the cost of training can be an obstacle to accessing training. The teachers were concerned about finding ways to pay for JASON training and about inconsistencies in the cost of JASON training at different sites. "And every state seems to have their different way of funding the exact [training]—and every school district—there's no consistency at all" (3).

Teachers in all groups were concerned about the cost of JASON. Many talked about an ongoing struggle in their districts to find the funding for the curriculum and training. One teacher has a hard time making her district understand why she needs funding for training every year.

> *The thing with teacher training, and this is something that JASON needs to understand, my school district argues with me every year when I want to go back to training and take the rest of my team. Well we've already been trained in JASON project. But you don't understand. It's a new curriculum. All kinds of new hands-on things. Your teachers need to go back and work with other teachers and share. You know, and they don't want to spend, what—$50 or whatever? (3)*

> *There were a bunch of teachers [in my county] who were excited after the workshop but didn't have the funding. Their schools didn't have funding. The district didn't have funding. For some people that may not sound like a large amount of money, but for us, we're already forking out enough from our own pockets. (1)*

For the homeschoolers, who paid for the curriculum and their training out of their family budget, cost was a major issue. Besides the cost of the curriculum, they also objected to the limit of 30 students per site license for use of the curriculum. "I had to get a job to get JASON, but it [the job] helped pay for it, so the idea of spending $200 on something—that's not something that's reimbursable" (5). Another homeschooler, who is well supported by her state, was concerned about the different cost for JASON in different states. "I get concerned when I talk to other homeschoolers and they are looking at these $200 fees that are not affordable" (5).

Teachers asked if the JASON Foundation for Education could give them fund-raising ideas. For example, they wanted to know if there were specific corporations they could approach about business/school partnerships. Further, some teachers talked about the need for them to market to other schools the JASON multimedia science curriculum as a way of building funding support. "I talked to my local representative to see if he could help me get some funds, he had no clue what was going on. There has to be presentations, a statement to the state legislature, and let them know what JASON is and how it would fit into science, math" (4).

Some teachers suggested that JASON communicate directly with schools to emphasize the importance of financially supporting JASON training.

Development of Support in Schools and the JASON Community

While most teachers felt a sense of community within the JASON environment, some felt isolated within their own schools. Teachers suggested ways for the JASON Foundation for Education and their respective schools and districts to deal with some of the training and support issues.

Interacting with others in the JASON community was not just an important part of training, according to many of these teachers; it was also an ongoing source of inspiration and support throughout the year. Teachers found the support they needed in the JASON environment and

talked about its importance to the continuous development of a sustainable JASON community.

> *I built up a good relationship with this one lady that [I met at a training]. I could call her, and we helped each other. She helped me a lot. (4)*

> *There is the online aspect, and there is a message board. There are so many different ways that you can communicate with all the JASON teachers out there...[and ask], "Do you have any suggestions?" And then you've got all these different teachers who've done it writing in "And this is what I did" and "This is what I've tried" and, I think that that not only helps the teacher with that particular activity, but it also builds a JASON community support system. (1)*

Judging from the teachers' comments, the training provides a welcome opportunity for them to interact with other JASON teachers in a supportive way, which builds a sense of community and shared purpose.

> *I always think that the main thing about [training] is it gives you this ongoing sense that you are part of a larger group. Of course when we do it, I would be just one member of my school district and you meet people from other districts, and that's not a bad thing. That's something I think that textbook-based learning and a lot of other curriculum projects miss...the social aspect. (1)*

The interaction enables teachers to share ideas and learn from each other. One teacher saw the other JASON teachers as a valuable technical assistance resource, better than the online support services outside her school. "We did a unit, had a teaching unit there so we were being trained because we already had been there a couple of years and so we went through the units and it was good to see the other teachers tell you what type of things you had to watch out for...." (2). However, one special needs teacher appeared not to be aware of JASON's support resources: "In between the time that I went to the original workshop and the live broadcast, I never spoke to anyone, I never got the second half of the video, I didn't really have any contact with anyone. And I didn't know, maybe that was me, maybe there was something I was supposed to do" (4).

The homeschoolers, who were generally skeptical about homeschoolers taking the time for follow-up training, warmed to the idea when they thought about the opportunity to network with other homeschoolers. "There are some really great ideas that people have, and when first presented with the curriculum, you haven't looked through it, you haven't started investigating, but to be able to take advantage of the creativity other people have, I think, would be a great opportunity" (5).

For those who are the only teachers in their school or region teaching JASON, the rewards of membership in the JASON community are harder to tap into. They often expressed frustration their inability to get their schools or colleagues onboard and talked about feeling isolated. For example, one at-risk teacher was frustrated because the other teachers in her school were not interested in using JASON with her. "[With] language arts, we could have really pulled something togeth-

er. And the other teachers wanted nothing to do with it, which to me is a shame because this is really real, happening now. That's what makes it so cool" (3). One special needs teacher had heard about team-teaching JASON and described her frustration at having to do it alone. "I didn't have that. I would like to do that, not only within my own classroom but as a group. I found it frustrating, personally" (4).

Teacher Suggestions About Support

Despite these challenges, focus groups participants very enthusiastically came up with recommendations for the JASON Foundation for Education as well as their school and district administrations. For example, teachers who were team-teaching JASON thought the training would be even more beneficial if their whole teams could attend the conference. "I think as a team, if you can attend as a team it would be a lot better. The interdisciplinary planning would be a lot easier ..." (2).

Teachers talked about how much the JASON NEC conference had turned them on and expressed the wish that more teachers could have access to the conference. "Get as many teachers here at this training as possible—this conference. Because I've gone to the last three years, ... I have never walked away as motivated as I was the first night we were here" (3). Moreover, one teacher suggested improving the local trainings by modeling them after the JASON NEC as a more realistic, less costly, alternative. "What about just making sure that teacher training in the local PIN areas is more consistent and better. If this is such a high motivating place, why shouldn't all of those teacher workshops be that way?" (3).

CONCLUSION AND RECOMMENDATIONS

The five focus groups provided valuable data about teachers' use and the reported impact of the JASON multimedia curriculum. This information complements the survey findings (see Ba et al., 2002), deepening our understanding of teachers' perceptions of the JASON Project's benefits for students along with implementation challenges. Here, we first summarize the teachers' comments and recommendations. We then provide CCT's recommendations to the JASON Foundation for Education, based on the findings of this report.

JASON teachers like the flexibility, interdisciplinary approach, and aligned standards of the JASON multimedia science curriculum. Teachers serving different student population use the curriculum differently. For example, teachers of students labeled *gifted or honors* have considerable flexibility to tinker with the curriculum; teachers of *at-risk or low achieving* students have to adapt the curriculum requirements to specific students' reading comprehension and writing abilities; and teachers of *special student populations* find the curriculum flexible as well as challenging for students with specific learning difficulties or limited English proficiency.

Despite the variations in their use of the JASON curriculum and the challenges teachers face using it in their respective classrooms, they indicated overall that the JASON Project introduced them to technology and helped them integrate technology into their teaching; increased collaboration between teachers and homeschoolers; and made classroom management easier. As a result, their students benefited from the JASON curriculum. For students, it improved their learning and performance; excited them, promoted collaboration with other students, and helped them with reading, writing, and answering questions; reduced their fear of confronting challenges or ambiguity in classroom activities; increased parental participation in their children's schooling; and increased their awareness of the world around them and of everyday science in that world.

To maximize the effectiveness of the JASON multimedia science curriculum, teachers think the JASON Foundation for Education and their respective schools and districts should be aware of the implementation challenges they face in their classroom and schools. This discussion focused on two main topics: (1) the need to improve the curriculum through adaptation, and (2) ongoing training and support. The adaptation issues discussed included: accessibility of the print curriculum, curriculum and academic-level issues, quality of hands-on activities, issues related to standards and testing, and technology access and multimedia issues. The teachers faced the following training and support obstacles: distant training locations and training time; technology compatibility and TJO access levels; not enough demonstrations of hands-on activities; cost and marketing issues; and lack of support in school and the JASON community.

The CCT research team has two general recommendations. First, it is important that the JASON Foundation attend to specific curricular materials to make them easier to use in diverse educational settings. Second, the JASON Foundation should work to increase teachers' access to the training for its multimedia science curriculum. Specifically, the JASON Foundation needs to consider the following issues:

- Maintaining a balance between hands-on content and theoretical content
- Maintaining a balance between the print curriculum and the various technology components
- Labeling the research materials and technology components by degree of difficulty
- Producing videos demonstrating hands-on activities that are doable within a regular classroom period, and make these videos available on tapes, CD-ROMs, and online
- Expanding the bibliography in the print curriculum and help disseminate information about extra materials available for special populations
- Creating links on the JASON website for sites referenced in the print curriculum
- Translating more JASON curricular materials into Spanish, and increase awareness among teachers of the current availability of materials in Spanish and other languages
- Producing audio versions of the JASON books and other reading materials
- Establishing a scholarship-training program to increase teacher participation in the JASON National Educator Conference
- Encouraging local training to be modeled after the JASON NEC Conference as a realistic and cost effective alternative to present training

Teachers who participated in our study view the JASON Foundation as a strong potential ally in their efforts to successfully implement the JASON Project in their schools and districts. The JASON Foundation can help them by communicating directly with school or district administrations about the importance of:

- Giving students access to JASON chat rooms and the Internet
- Increasing the time for participation at live expedition sites (PIN sites)
- Combining class periods into one long period in a team-teaching situation
- Providing ongoing training and support, especially providing ideas about how to fund-raise
- Marketing to other schools the JASON multimedia science curriculum as a way of building support for funding it
- Networking to share experiences and resources among JASON teachers.

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APPENDIX: FOCUS GROUP PROTOCOL

I OPENING REMARKS AND INTRODUCTIONS

1] Introduce the team and each person's role

2] Explain the evaluation and the focus group (to get more in-depth feedback and exchange of ideas, and tell them that we are looking at teachers of different student populations and that during the discussion they should remember to include the aspects of their experience that are particular to teaching that population.

3] This focus group will be audiotaped so that we don't lose any of your comments. The tapes will be transcribed and used to write a report. The report will not identify any of you by name or school.

4] This focus group will basically be a discussion of your experiences with the JASON curriculum. We want it to be a free and open discussion, rather than a structured question-and-answer session. Everyone should participate, but please speak one at a time and avoid side conversations so that we can hear everyone's comments and the tape recorder can pick up everything being said. Due to our time limitations, we may occasionally need to cut someone off or change the direction of our discussion, so please bear with us.

5] Remember, there are no right or wrong answers. Critical feedback is just as important as positive feedback, perhaps more so.

6] Before we get started I'd like you each to introduce yourself. Please tell us your name, where you're from, what grade(s) you teach, and the extent of your JASON experience.

II ICE BREAKER: I would like you each to describe a typical day in your JASON classroom.

III THE CURRICULUM

1] Thinking about the JASON curriculum in terms of its content (aligned with national standards, interdisciplinary, inquiry-based, hands-on, and assessment tools), its *format* (multimedia components: print curriculum, video, live broadcast, and Team JASON online), and any *other aspects of the curriculum* you feel are relevant, could you discuss the strengths and weaknesses of the curriculum?

2] Could you talk about how you use JASON: how much *time* you devote to it (*ask about survey finding that shorter class periods were associated with use of more components*), how frequently you teach it, what *configuration of components* you use and why, and any adaptations or modifications you make and why? (For example, *team teaching*)

v TEACHERS

1] JASON offers a variety of different training formats for teachers (local in-school, in-district, or regional training; face-to-face at live broadcast site; online professional development; face-to-face at conference; video conferencing; JASON academy distance education). Can you talk about the training that you have received, including the strengths and weaknesses of each training format and of the multi-format approach as a whole?

2] Can you talk about the ways, good or bad, that JASON has affected you as a teacher (of science or other subjects). For example, teaching style, enthusiasm, use of technology, knowledge base, time availability, time management, creativity, etc.

3) In what ways, positive and negative, has JASON affected classroom dynamics? For example, is classroom management more or less difficult, how does it affect student interaction, do certain students get left out or left behind? What particular aspects of JASON cause these differences?

4) Can you discuss particular challenges you face in teaching Jason? For example, lack of technology, lack of technology training, lack of teaching support, lack of time, lack of equipment or supplies, etc.

vi Students

1] Can you talk about the *ways, good or bad, that JASON has affected your students.* For example, science knowledge, scientific inquiry skills, use of technology, interest in science or other subjects, confidence, enthusiasm, creativity, learning process, grades, performance, curiosity, etc. How have these effects spilled over into other subjects (*perhaps because of interdisciplinary approach*)?

2] Can you talk about any needs your students might have that inhibit their ability to get the most out of JASON? For example, lack of supplies, lack of time flexibility, etc.

vii SUGGESTIONS: If you could change one thing about JASON, what would it be and why and how would you change it?

viii WRAPPING UP

1] I think we've covered every thing, have we missed anything? Do you have any additional questions you'd like to ask or final comments you'd like to make?

2] I want to thank you all for your participation in this focus group. Your feedback on the JASON curriculum will help us to make it more responsive to your needs.

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